

1st Revolution 1953-66
 2nd " " last 10 years.

Genes - DNA (RNA) Backbone - S
 Base pair - S
 Pairing - S
 Double Helix - S

Genic
 Pl
 Rnd

Amount of DNA

Gene - a stretch of DNA - RNA working copies
 - structural
 - code for protein. 20 amino acids per typical length.
 GAA → glutamic acid - GAA
 5' reading

How many distinct pieces. $\left\{ \begin{array}{l} \text{virus} \quad 3-10 \rightarrow \approx 100 \\ \text{E. coli} \quad 2,000 - 3,000 \\ \text{Man} \quad 100,000 ??? \end{array} \right.$

Recombination DNA

can cut, & join, & transfer to other organisms,
 multiply, and recombine. The problem: only one (no) copy per cell.
 cut + join - restriction enzymes. - S
 a few pairs of hands.

10²⁰
 10²¹ mols.

join up the new join up new combinations.

transfer: main methods of viruses → chromosome.
 biological (mechanical; - recom. transposon? plasmid) vs.

multiply: biological approaches example E. coli: 10⁹ in 16 hours.
 virus: $\leq 1\frac{1}{2}$ hours.

sequencing: new rapid methods \approx several billion in a few days.
 is enzymes, isotopes, chromatography.

An example ϕ X174 Sayle - S
 lac operon genes in man. present etc. in mitochondria.

109
 2³⁰ ~ 10 hours

256
 28

Given - DNA (RNA) - 2
 Protein - 2
 Lipid - 2
 Carbohydrate - 2

Amount of DNA

Given - 2 strands of DNA - 2
 Each strand is 1000 nucleotides long
 Total number of nucleotides = 2000

The number of bases in DNA is 4
 A, T, C, G

Probability of DNA

In a DNA sequence of 1000 nucleotides, the probability of finding a specific sequence of 3 nucleotides is $\frac{1}{4^3}$

$$6 \times 10^{23} = 18 \mu\text{m}$$

$$\frac{1}{3} \times 10^{23} = 1 \mu\text{m} = 1 \mu$$

$$\frac{1}{60} \times 10^{23} = \frac{1}{20} \mu$$

$$\approx 10^{21} =$$

cademic : to have fun and learn a lot of it
: how genes produce an organism - genetic
: junk DNA.

Applications

make new proteins in host

(embryology)

(ONCOGENES)

e.g. human protein in bacteria, or in yeast.
insulin, growth hormone, interferon.
- many more likely to follow.

new methods of diagnosis

if a "probe" is available

can detect bad genes e.g. sickle cell.

Some new genes for human genetic markers -
for genetic diagnosis.

(I'll do it later when you are free do -)

New organisms e.g. purple bacteria.

Industrial using enzymes for industrial purposes.

e.g. to make common chemicals, alcohol (energy)
: structure

how many more enzymes stable enough.

Autism

(family trees) my β globin is to
Morgan's descent.
archaeo anthropological. how has a globin appear to be
Spanish. Italian
mitochondrial DNA \rightarrow 1 human?
(15kb)

Other techniques

monoclonal antibodies

all one type
not mixed

3D recognition.

Useful to produce for very specific

as tests chemical tests, for receptors - diagnosis
protection

with vaccine, antibody.

Second kinds

new techniques, subunit protein
development or
i.e. new synthesis.